plans to replace all of its remaining analogue switches within three years, its CCA valuation of local exchanges is on the basis that all switches are digital. But the approach may not always lead to the use of the MEA as the basis for asset valuation. For example, in the next three years BT expects to retain transverse screen cable in some transmission circuits, rather than replacement with optical fibre circuits. To that extent, the 'three year look' approach differs from pure MEA. BT argues that its approach is justified because it reflects the practical difficulties and time lags involved in updating a nationwide network to the latest available technology.

METHODOLOGY TO CALCULATE LONG RUN INCREMENTAL COSTS

D.6 For the calculation of long run incremental cost (LRIC), the network has been defined as a stand-alone network of inland Public Switched Telephone Network (PSTN) services and private circuits. The network assumed in the incremental cost methodology therefore excludes advanced services such as Integrated Services Digital Network (ISDN) and Virtual Private Networks.

D.7 Incremental costs include only the costs that are caused by the provision of a defined increment of output. In the methodology to calculate incremental costs, the increment in question is the whole of the output of a service - two services are considered: conveyance and access. The long run incremental cost of conveyance is the cost that would be saved in the long run if no traffic were provided over the network, but access were to continue to be provided. It is assumed that all assets are replaced in the long run and so it is assumed that there are no sunk costs in the long run. The incremental cost of access is the cost that would be saved in the long run if no final links to customers were provided (but, hypothetically, conveyance continued to be provided). If there are economies of scope between conveyance and access, it will follow that there are common costs of the network, ie costs of the stand-alone network that are incurred when conveyance and access are provided simultaneously, but are incremental to neither of conveyance nor access on its own.

D.8 In order to establish a robust methodology to calculate long run incremental costs, the Interconnection and Accounting Separation Task 19 Steering and Working Groups have been overseeing the development of two modelling exercises. BT has developed a top-down model, which starts from its management accounts and removes costs that are not incremental. The Incremental Cost Working Group has constructed, and populated with data, a bottom-up model of the network using economic-engineering models that attempt to identify, for a fully efficient operator, the engineering elements required to build a network and to estimate their generic costs.

D.9 BT's top-down model contains a large number of categories of cost (583). Some categories relate to direct costs, others to indirect costs (eg personnel). For each category BT has identified one or more cost drivers and a cost–volume relationship, describing the rate at which costs would fall in the long run with a decline in the volume of the cost driver(s).

D.10 Starting from the level of cost in each category derived from BT's HCA accounts, the volume of the cost driver associated with retail and non-PSTN activities is applied to the cost–volume relationship to give the costs relevant to the stand-alone network. The volumes of the cost driver associated with each of conveyance and access are identified. Each is applied to the cost–volume relationship starting from the point relevant to the stand-alone network, to yield the incremental cost. The total incremental costs of conveyance and access are found by summing over all 583 categories. The incremental cost of conveyance is split into the costs of network components by applying the proportions that are used in BT's management cost accounts by service. Finally, an attempt is made to convert the costs of network components from HCA to CCA by an adjustment factor given by the ratio of CCA costs to HCA costs for that network component in BT's management accounts.

D.11 BT regards the top-down model as a demonstration of a methodology and recognises that it may require some restructuring and development. OFTEL is aware that there are a number of areas where the model requires improvement before it will produce robust results. Problems with the top-down model in its current form include the level of aggregation at which the conversion from HCA to CCA costs is carried out, the fact that some of the cost–volume relationships appear to be out of date, and the complexity of the model which, combined with a lack of adequate documentation, makes it difficult to audit. Strengths of the top-down model are that it examines costs in a highly disaggregated way and that it is fully articulated: ie it reflects the complex inter-linkages which often occur in relating a cost to a network component.

D.12 The bottom-up model consists of three constituent economic-engineering models. The incremental cost of conveyance is derived from the Network model, which models the cost of a typical tandem and local switch and typical transmission links, each dimensioned at the capacity needed to serve a specified percentage of UK traffic. Thus far the Working Group has focused upon the costs of an operator with 50% of UK traffic, but future work will lead to sets of generic figures for an operator with 60%, 30% and 10% of UK traffic (assuming the UK average customer mix). For modelling purposes it has been assumed that the number and location of BT's switches are given (the 'scorched node' assumption). The alternative would be to assume a pure greenfield approach and allow the number and location of switches to be fully optimised, but the Incremental Cost Working Group considered that this would lead to excessive complexity in the modelling.

D.13 The replacement cost of switches and transmission links is converted into a cost per annum by using an annuity formula. Operating costs are allowed for in the model through ratios of operating costs to capital costs for switching, transmission and access. The operating cost factors are derived by OFTEL from information submitted by a number of operators on the relationship between operating costs and gross replacement costs on their existing networks.

D.14 The incremental cost of access is derived from the other two constituent models: the costs of the provision and maintenance of lines from the exchange to the cross-connect point are modelled in the Feeder model, and from cross-connect point to households in the Distribution and Drop model.

D.15 Further work remains to be done by the Working Group to refine the bottom-up model and the generic data with which it is populated. First, the algorithms in the model tend to abstract from logical inter-relationships between parameters, leaving them to be taken into account outside of the model by each operator when deriving its model inputs. Therefore, care will need to be exercised to ensure that the generic figures, derived by OFTEL from the data submitted by a range of operators, are based on a set of consistent assumptions. Second, the modelling of operating costs is not fully articulated and the derivation of the operating cost factors inevitably involves an element of judgement. Third, the modelling of transmission will require further work, to develop the costs for point to point transmission [illegible] and private circuits and to compare [illegible] transmission network [illegible] multiplexing (the approach that [illegible] transmission network). The strengths of the bottom-up model are its transparency and relatively simple structure. It allows operators to understand the derivation of network costs, because it explicitly focuses on the parameters which drive network dimensioning.

D.16 The top-down and bottom-up models have different treatments of depreciation. The top-down model assumes straight line depreciation; the annuity approach in the bottom-up model implies a depreciation profile with relatively little depreciation in the early years of the asset life and relatively more in later years. It is possible, however, that neither approach captures the [illegible]

of economic depreciation. This is an issue that will need to be explored further in both models.

D.17 Since the top-down and bottom-up models have different strengths and weaknesses, both will have a role to play in deriving the robust methodology to calculate incremental costs. Improvements to both models will continue to be made under the guidance of the Incremental Cost Steering and Working Groups. One way in which the models will be developed is to ensure that key issues (eg economic depreciation) are treated in a consistent fashion and that parameter assumptions (eg asset lives and cost of capital) are the same in both models, except where differences reflect differing levels of efficiency. This should bring the results of the two models closer together and allow each model to provide a useful cross-check on the other. It will then be possible to derive robust results for incremental costs by identifying the source of any remaining differences and making judgements about the appropriate parameter values or methodological approach. A report by consultants giving details of the two models and the further work planned will be available shortly from OFTEL.

FLOORS AND CEILINGS

D.18 The proposed system of ceilings and (guideline) floors on the charges set by BT for network components was outlined in Chapter 5, Interconnection and Network Charge Cap. The level at which the ceilings and floors would be set is discussed in greater detail in this section.

D.19 A simplified representation of the relationship between various concepts of cost (incremental, common and stand-alone cost) and the proposed floors and ceilings is shown in Figure D1. The current methodology to calculate incremental costs breaks down the cost of the stand-alone network into the incremental cost of access, the incremental cost of conveyance and the common costs between access and conveyance.

D.20 In principle, by defining each network component as an increment, the incremental cost of conveyance could itself be broken down into the incremental costs of the network components and the common costs between those components. Common costs between components would exist if there were economies of scope between components, which might arise, for example, from the co-location of switches or the sharing of duct between different transmission links. For simplicity, in Figure D1 it is assumed that there are just two network components, switching and transmission. (In the current interconnection regime the network components are local switch, main switch, junction transmission link, junction transmission length, trunk transmission link and trunk transmission length.)

D.21 The current methodology to calculate incremental costs does not, however, define each component as an increment, but takes the increment to be the whole of conveyance and derives the costs of components accordingly. This definition of the increment abstracts from any common costs between network components, ie the incremental cost of conveyance is necessarily equal to the sum of the costs of the components.

D.22 Using the current methodology, the proposed floor to the charge for (say) transmission would be given by the incremental cost of transmission plus a proportion of the common costs between switching and transmission, expressed as an average per unit of output (eg pence per minute). The remaining common costs between switching and transmission would be included in the proposed floor for switching. Therefore, floors given by the current incremental cost methodology would normally be higher than the average incremental costs of components, because they would include a proportion of the common costs between network components.

D.23 The stand-alone cost of a component is the cost that would be incurred if (hypothetically) that component, but no other components, were provided. It is therefore given by the incremental cost of that component plus all of the common costs that are relevant to that component.

D.24 The common costs between access and conveyance can be broken down into the costs that are common between access and transmission (arising, for example, from duct sharing) and the costs that are common between access and switching (arising, for example, from concentrators). The stand-alone cost of transmission would be given by the sum of the incremental cost of transmission, the common costs between switching and transmission and the common costs between access and transmission. Similarly, the stand-alone cost of switching would be given by the sum of the incremental costs of switching, the common costs between switching and transmission and the common costs between access and switching.

D.25 Using the current methodology, it is proposed that the ceiling to the charge for (say) transmission would be calculated as the proposed floor for transmission (ie the incremental cost of transmission plus a proportion of the common costs between switching and transmission) and the common costs between access and transmission. The proposed ceiling would therefore normally be lower than the stand-alone cost, because it would include only a proportion of the common costs between network components rather than all of such costs.

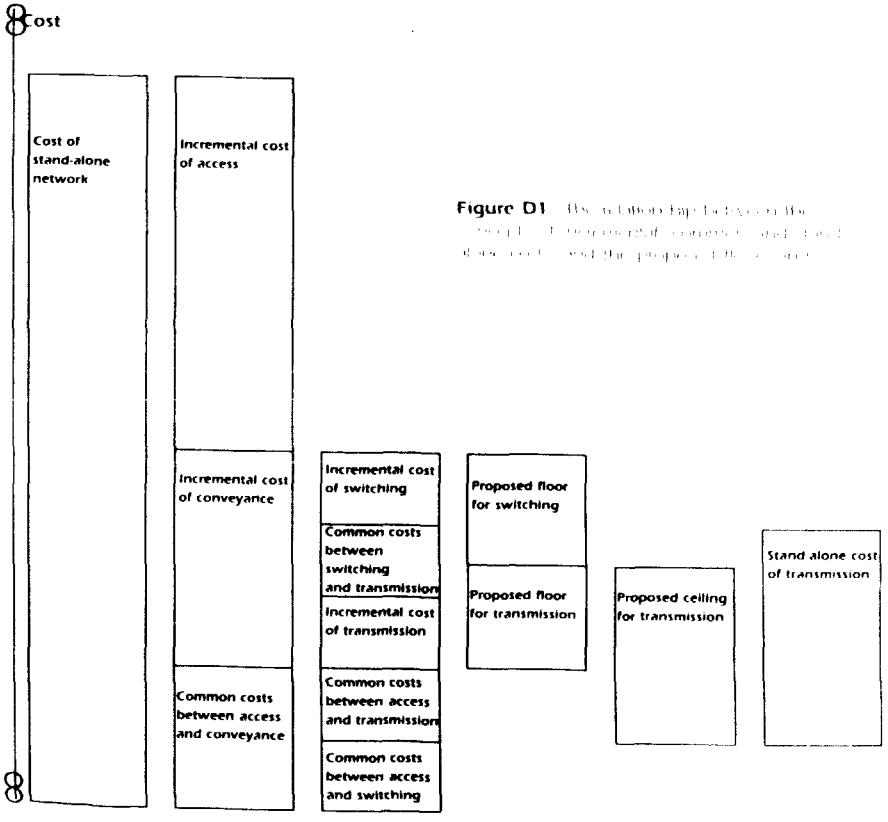

Figure D1 [illegible]

ANNEX E

Financial Modelling

I INTRODUCTION

E.1 As in previous price control reviews, OFTEL will base its proposal on each price cap and sub-cap on forecasts of BT's financial performance, which will be generated using a financial model. Into this model will be fed assumptions about a number of key determinants of BT's profitability over the forecast period, and the modelling process will produce a range of price control formulae that should lead to BT earning no more than an acceptable rate of return on each basket or sub-cap by the end of the price control period (subject to views expressed in consultation on this document on the desirability of a one-off adjustment to prices at the start of the period).

E.2 Since the aim of regulation is to mimic the workings of a competitive market, an acceptable rate of return for BT's price-controlled activities would be equal to its cost of capital on those activities. The next section deals with the derivation of the cost of capital for BT, and presents a range of estimates upon which comments are sought. The subsequent sections deal with the appropriate measure of rate of return that the estimated cost of capital should be applied to within the financial model. In the final section, the basic structure of OFTEL's proposed model is discussed in some detail.

II COST OF CAPITAL

E.3 A firm's cost of capital can be defined as the rate of return that could be earned in the capital market on securities of equivalent risk. In general, the higher the riskiness of the firm's activities, the higher its cost of capital, since investors typically require compensation for greater risk.

E.4 In recent price determinations and when setting the standard charges for interconnection to BT's network, OFTEL has used a cost of capital of 15%. This rate is in nominal terms, is measured before investors' taxes and has been applied to historic cost asset valuations (or compared to historic cost accounting rates of return).

E.5 As part of the current review, OFTEL needs to update its view on the cost of capital that should be used to set the price controls on BT over the following control period. Accordingly, it has sought expert advice on the theoretical foundations of and empirical evidence on the cost of capital, and in particular what this would imply for BT.

E.6 OFTEL will announce its conclusions on the cost of capital in the consultative document to be published next March. The following subsections give a brief overview of the general theory behind the calculation of the cost of capital, provide an indicative range of estimates of the cost of capital for BT under various assumptions and suggest how this might differ for those activities which are subject to price control.

Methods of calculating the cost of capital

E.7 For a firm financed by debt and equity such as BT, the cost of capital will be a weighted average of its cost of capital from both sources. In what follows, general techniques used to derive the cost of equity and debt are first discussed; this is followed by indicative estimates of the components of the weighted average cost of capital for BT, leading to an indicative range for BT's pre-tax weighted average cost of capital, on which OFTEL seeks views.

Cost of equity

E.8 Two main methods are typically used to establish a firm's cost of equity. The most widely used model for estimating the equity cost of capital is the **Capital Asset Pricing Model (CAPM)**. The basic premise of this model is that investors require a higher expected rate of return on any investment in order to compensate them for a higher risk of returns on that investment (as measured by the variability of those returns).

E.9 Investors are assumed to be able to reduce risks by holding diversified portfolios of equities. However there is a degree of systematic risk inherent in even the most diversified portfolio of shares, since the value of the whole stock market can rise or fall, reflecting the risk inherent in the general economy.

E.10 This non-diversifiable risk cannot be eliminated by holding shares in a large number of companies, and is therefore a component of the cost of equity. If the risk-free rate is that rate of return which investors would be able to earn with certainty, the market risk premium is that additional return that investors would require in order to compensate them for holding a share whose returns moved in line with those of the stock market as a whole.

E.11 Returns on shares in some companies will fluctuate in step with, but more widely than, returns to the stock market as a whole. Returns on other types of shares will fluctuate in step with, but less widely than, the stock market as a whole. Others still could move against the market. The degree of correlation between returns on shares in one company and returns on the stock market as a whole can be estimated using dividend and share price data and is captured in a coefficient known as the company's Beta. A company showing higher than average non-diversifiable risk will have a Beta coefficient in excess of one, while a company showing lower than average non-diversifiable risk will have a Beta less than one.

E.12 The cost of equity to the firm can then be calculated according to the basic CAPM formula below:

$$R_e = R_f + \text{Beta}\,[E(R_m) - R_f],$$

where R_e is the cost of equity finance, R_f is the risk-free rate of return, Beta is the degree of correlation between returns on the company's shares and returns on the stock market as a whole, $E(R_m)$ is the expected return on the market and $E(R_m) - R_f$ is the expected market risk premium or excess return to equities.

E.13 This calculation can be done in real or nominal terms. The two should have identical implications for measuring the financial performance of the enterprise, provided that the inflation rate assumed in the financial forecasts is the same as that implied by the difference between the estimated real and nominal cost of capital.

E.14 One criticism often levelled at the CAPM is that the calculation of the equity premium is based on historic excess returns on equities rather than the returns that investors expected to achieve. Since investors base their decisions today on a set of returns and their variability in the future, it would appear preferable to look at expectations directly. This is particularly important in the light of evidence that suggests that the risk premium varies over time, so that estimates of historic excess returns may not be a reliable guide to excess returns required in the near future.

E.15 The main alternative model, the **Dividend Growth Model (DGM)**, attempts to allocate these problems by using the expectations of investors directly. This model can either be applied to the whole stock market, in order to obtain an estimate of the market equity risk premium to be substituted into the CAPM formula discussed above, or can be used directly to estimate the cost of equity for an individual firm.

E.16 In the firm-specific version of the model, the firm's cost of equity is assumed to be equal to the discount rate which, when applied to the expected future dividends on shares in that company, makes the sum of these dividends equal to the current share price. More simply, if it is assumed that dividends are expected to grow indefinitely at an annual rate g, then the cost of equity to the firm can be shown to be given by:

$$Re = D_0/P_0 + g,$$

where D_0 is the dividend paid at time 0 and P_0 is the share price at time 0.

E.17 The main difficulty with this type of calculation is that it is necessary to form a view about investors' expectations of future dividend growth, and these expectations are usually difficult to elicit with any degree of accuracy. Analysts' forecasts of future dividends on shares in large companies such as BT can be used as an indicator of market expectations of future dividend growth. However, it is questionable whether sufficient independent forecasts are available to provide an accurate estimate of BT's cost of equity. A further problem with this technique is that analysts' forecasts do not typically extend far beyond two years into the future, so that estimates of g are very speculative.

E.18 Nevertheless, since OFTEL needs to calculate BT's cost of capital over the next control period, it is important to take account of forward-looking estimates, especially in the light of evidence that the cost of capital tends to change over time. Indicative estimates of BT's cost of equity derived from the DGM are therefore presented alongside CAPM estimates in the following sections.

Cost of debt

E.19 In the absence of specific information on the interest rates being paid by the firm in question, the pre-tax cost of debt is typically calculated by adding a small corporate risk premium to an estimate of the risk-free rate of return, as proxied by the return on government debt used in the CAPM calculation.

INDICATIVE ESTIMATES OF COST OF CAPITAL FOR BT

Post-Tax Cost of Equity

E.20 In this sub-section, historical estimates of the cost of equity to BT are built up from individual components of the CAPM formula explained above, and compared to forward-looking estimates based upon the DGM approach.

Risk-free rate of return

E.21 The nominal risk-free rate of return is typically calculated as the yield on fixed-interest government debt of a certain maturity. The choice of maturity depends upon the time horizon over which the risk-free rate is to be estimated. For OFTEL's purposes, this might be the length of the next price control period, ie around 5 years. Gross redemption yields on gilts of this maturity are currently around 7.6% for a zero rate taxpayer. However, from BT's point of view, a more appropriate maturity might be one which corresponds to the average life of its assets. Since this is fairly long, yields on gilts with maturities in excess of 15 years would be an alternative choice for the risk-free rate of return. Gross redemption yields on gilts of this maturity are currently around 8.4% for a zero rate taxpayer.

E.22 The real risk-free rate of return which is consistent with the nominal rate can be estimated from the yields on index-linked gilts of similar maturity. The implied inflation rate expected by investors over the period can then be calculated as the proportionate difference between the two.

E.23 A further complication is that the estimated post-tax risk-free rate and the implied inflation forecast depend upon the tax rate that is assumed for the marginal investor, since the gilt which offers the higher post-tax yield will be different for zero rate taxpayers then for basic rate taxpayers, for example.

E.24 Table E.1 gives an indicative range of the nominal and real risk-free rates of return for gilts of

Table E.1 [illegible]

Period:	Nominal		Real		Inflation rate*	
% per annum	5 year	15 year	5 year	15 year	5 year	15 year
Before inflation risk adjustment						
0% tax payer	7.6	8.4	4.3	4.7	3.1	3.5
25% tax payer	8.0	8.8	4.6	5.0	3.3	3.7
After inflation risk adjustment						
0% tax payer	7.1	7.4	4.3	4.7	2.7	2.6
25% tax payer	7.5	7.8	4.6	5.0	2.8	2.8

Note: [illegible]

different maturities, together with the implied inflation rate, based on different assumptions about tax rates.

E.25 It is possible that medium- and long-term nominal gilt yields incorporate a risk premium over and above short-term yields in order to compensate investors for uncertainty about inflation. In the bottom half of Table E.1, the risk premium has been assumed to be 0.5% for five-year gilts and 1.0% for fifteen-year gilts. Nominal gilt yields and implied inflation rates have been adjusted accordingly, and it has been assumed that the inflation risk premium is negligible for index-linked stock.

E.26 The overall range for the real risk-free rate of return of 3.3% to 4.0% compares with a range of 3.5% to 3.8% used by the Monopolies and Mergers Commission (MMC) in its report on Scottish Hydro-Electric plc (SHE) published in May 1995.

Equity risk premium

E.27 The market risk premium can be estimated in two main ways, as discussed in the previous sub-section. The standard CAPM approach is to calculate the total return on equities over and above returns on gilts for a given past period. The alternative approach is to use forecasts of investors' required rates of return on equities, as calculated using the DGM. Each of these methods of estimation can give very different answers depending on the period over which the calculations are performed, and depending on whether average excess returns over time are calculated as an arithmetic (simple) or geometric mean.

E.28 Estimates of historic excess returns on equity from the UK, US and Japan range between 4.0% and 9.4%. Estimates calculated over shorter and more recent periods, using the DGM for the US, give a slightly lower range of estimates (6.5% to 7.5%). Equivalent estimates using the DGM for the UK stock market do not exist. Two recent surveys of fund managers in the UK suggest that the risk premium required on equities may be as low as 2.5% to 3.0%. However, these surveys were based upon relatively small sample sizes, and may not be reliable. The weight of evidence from academic studies at this stage suggests that the market risk premium lies above 4% but below 8%.

E.29 [illegible] the current size of the equity premium may be lower than that implied by historical estimates from stock market data. Risk premia as high as 8% or 9% do not appear to be consistent with investors' levels of risk aversion, as measured by alternative methods. There is also some evidence to suggest that risk premia vary over time: forecasts of required returns on equities which relate returns on equities to other observable series, such as returns on other types of security, provide estimates towards the bottom end of the 4% to 8% range.

E.30 In price control reviews over the last three years, OFWAT and OFFER have used a market risk premium in the range of 3% to 4%. The MMC used

a range of 3.5% to 4.5% in the SHE report. OFTEL's initial view is that it would not be justified in considering a market risk premium greater than 6%. In the estimates of BT's cost of capital that follow, a range of 4% to 6% is used.

Equity Beta

E.31 The value of BT's equity Beta measures the volatility of returns on BT's shares compared to returns on the stock market as a whole. It will rise with BT's debt/equity ratio, since a higher level of gearing implies that a given change in profits will have a greater impact on the returns to holders of equity.

E.32 The estimated value of BT's Beta varies depending on the time period over which it is measured and on whether monthly or daily share price information is used. It can also be significantly biased if 'events' produce major changes in Beta which violate the assumptions upon which the CAPM methodology is founded. Examples of such events might be the stock market crash of 1987 and the general elections of 1987 and 1992.

E.33 OXERA and LBS Risk Management Service estimates of BT's equity Beta, using monthly data for the five-year period ending in May and June 1995 respectively, are 0.83 and 0.80. These appear to be robust to the omission of the 1992 general election.

E.34 These estimates of equity Beta relate to BT Group. In the past an estimate of Beta for BT Group has been used as a reasonable proxy for the Beta for the price-controlled activities. However, BT's Beta has risen since the time of the last price control review, probably mainly as a result of the expansion of its non-regulated business. This is likely to be more risky than its price-controlled activities, for two main reasons. Firstly, services in which BT still has a degree of market power will tend to be less risky than services where competition is better developed, since profits from this source will tend to be less volatile. Secondly, basic telephony services are more likely to be 'essential', implying that demand for them is likely to fluctuate by less than average over the cycle.

E.35 This suggests that services that remain outside a tariff basket will tend to be more risky than those within a basket. It is therefore likely that the implicit Beta for BT's price-controlled activities will be lower than that of BT Group. OFTEL intends to use a Beta of 0.80 in its estimate of the overall cost of capital for BT Group, but will consider the effect of reducing this in modelling the price controls.

E.36 As an illustrative example, the effect of reducing the value of Beta to 0.60 on the cost of equity is shown in the tables which follow. This figure is within the range of 0.50 to 0.65 used by the MMC for the equity Beta of SHE's electricity distribution business, typically viewed as being of low risk. The true Beta of BT's price-controlled activities is likely to fall somewhere in between 0.60 and 0.80.

Tax advantages to debt

E.37 The estimate of the post-tax cost of equity depends on the view taken on the size of any tax advantages to debt to be obtained by offsetting interest payments against corporation tax. Under the UK imputation system with advance corporation tax (ACT), the tax shield afforded by debt is significantly reduced compared to the US, for example. It is also possible that any remaining tax advantage to debt is captured by lenders in the form of higher interest rates.

E.38 In Table E.2, the range of estimates of the post-tax cost of equity includes scenarios in which it is assumed that there is a tax advantage to debt and scenarios where is it assumed that any tax advantage is captured by lenders. The estimates derived from the CAPM for each combination of equity risk premium and equity Beta also reflect the full range of real and nominal risk-free rates (ie with and without an inflation risk adjustment).

E.39 In the table, estimates of BT's cost of equity which have been derived directly from the DGM are shown as a comparison to those built up from the various components of the CAPM discussed above. The range of estimates from the DGM

Table E.2 [illegible]

		CAPM				DGM
	Equity premium	4	4	6	6	
	Equity Beta	0.6	0.8	0.6	0.8	
% per annum						
Nominal	Low	7.1	7.9	8.3	9.5	7.3
	High	9.4	10.2	10.6	11.8	10.9
Real	Low	4.6	5.4	5.8	7.0	
	High	5.6	6.4	6.8	8.0	

reflects forecasts of annual dividend growth rates from brokers' reports in the range of 3% to 6%, applied to BT's net dividend yield (4.3% to 4.9%) calculated at various points in time.

Post-tax cost of debt

E.40 Historical evidence suggests that 'blue chip' corporate debt commands a risk premium of approximately one half to one per cent higher than the risk-free rate. In the SHE report, the MMC used a range of 0.3% to 0.7% for the premium. In the indicative estimates of BT's weighted average cost of capital that follow, a 0.5% corporate risk premium has been used. In order to convert the resultant pre-tax cost of debt into a post-tax rate, corporation tax at 33% has been subtracted.

Post-tax weighted average cost of capital (WACC)

E.41 In the calculation of the post-tax weighted average cost of capital, weights equal to the proportion of debt and equity finance are applied to the post-tax cost of debt and equity in turn. It is usual to use market values of debt and equity in this calculation.

Adjustments for desirable gearing

E.42 In those scenarios where it is assumed that there is a tax advantage to debt, it may be argued that BT could reduce its cost of capital by increasing its gearing. BT's current gearing ratio is around 15%. OFTEL intends to consider whether BT's weighted average cost of capital should be adjusted downwards to reflect the fact that it may be under-geared. However, initial estimates suggest that even a large increase in gearing from current levels to 50% would decrease the post-tax WACC by at most 0.5 percentage points in real terms and 0.7 percentage points in nominal terms.

E.43 A potentially more important issue is if BT significantly increased its gearing beyond that which might be considered prudent. In such circumstances, any tax advantages from higher gearing might be outweighed by the higher risk premium charged by lenders and a higher cost of equity. OFTEL would not allow any increase in the cost of capital as a result of this kind of financial restructuring to affect this or any future price control regime.

E.44 Table E.3 gives an indicative range for BT's post-tax WACC. Again the ranges for each value of Beta and equity risk premium reflect different assumptions about the tax advantages of debt, different risk-free rates, as well as adjustments for higher gearing levels.

E.45 The indicative range of estimates of the post-tax WACC for BT Group using the CAPM with a Beta coefficient of 0.8 is **7.5% to 11.0% in nominal terms** and **5.0% to 7.3% in real terms**. This range may need to be adjusted downwards to give a cost of capital for the price-controlled activities. As an illustrative example, the lower end of the range would fall to **6.8% in nominal terms** and **4.3% in real terms** if a Beta coefficient of 0.6 were used for the price-controlled activities.

Table E.3 BT post-tax WACC: indicative ranges

		CAPM				DGM
	Equity premium	4	4	6	6	
	Equity Beta	0.6	0.8	0.6	0.8	
% per annum						
Nominal	Low	6.8	7.5	7.9	8.9	6.2
	High	9.0	9.6	10.0	11.0	10.2
Real	Low	4.3	5.0	5.3	6.3	
	High	5.2	5.9	6.2	7.3	

Pre-tax weighted average cost of capital (WACC)

E.46 The estimates of the cost of capital presented above incorporate the returns after tax which are required by investors to induce them to buy or retain shares in BT or to lend the company money. OFTEL needs to have a cost of capital estimate that can be compared to pre-tax rates of return in the financial modelling.

E.47 There is no direct method of deriving the company's pre-tax cost of capital for the next price control period from the post-tax estimates presented above, in the absence of information on future cash flows. A standard simplification that can be used to derive an estimate of the pre-tax WACC, which OFTEL has used in the past, is to multiply the post-tax cost of equity by

$(1 - ACT)/(1 - T_c)$,

where ACT = marginal rate of advance corporation tax (currently 20%) and T_c = marginal rate of corporation tax (currently 33%). The adjusted pre-tax cost of equity can then be combined with the pre-tax cost of debt using the gearing weights to give an estimate of the pre-tax WACC.

E.48 This adjustment is based upon a number of simplifying assumptions, eg that all profits are paid out as dividends. The correct adjustment will depend on BT's cash flow profile over the forecast period, amongst other things.

E.49 Table E.4 shows a range of estimates for BT's pre-tax cost of capital for an illustrative case using the simplified formula above. It is important to note that the range is only given for a gearing ratio of 15% and does **not** incorporate the adjustments for desirable gearing that are shown in the previous table. BT's actual pre-tax WACC may be lower or higher than this range, depending upon adjustments for desirable gearing and the cash flow forecasts generated from the financial model.

E.50 Under these simplifying assumptions, an indicative range for the pre-tax cost of capital for BT Group (using a Beta coefficient of 0.8) for the next price control period would be **9.2% to 13.4% in nominal terms** and **6.1% to 8.8% in real terms**. Again, as an illustrative example, the lower end of the range would fall to **8.4% in nominal terms** and **5.2% in real terms** if a Beta coefficient of 0.6 were used for the price-controlled activities.

Table E.4 BT pre-tax WACC: illustrative case for 15% gearing using simplified formula

		CAPM				DGM
	Equity premium	4	4	6	6	
	Equity Beta	0.6	0.8	0.6	0.8	
% per annum						
Nominal	Low	8.4	9.2	9.6	10.8	8.6
	High	11.0	11.8	12.2	13.4	12.4
Real	Low	5.2	6.1	6.5	7.7	
	High	6.4	7.2	7.6	8.8	

Note: See paragraphs E.47 to E.49 for a discussion of the simplifying assumptions used.

Table E.5 OFTEL indicative ranges for components of cost of capital/pre-tax WACC compared with [illegible]

	OFTEL Low	OFTEL High	MMC Low	MMC High
Real risk free rate	3.3%	4.0%	3.5%	3.8%
Equity risk premium	4.0%	6.0%	3.5%	4.5%
Equity Beta	0.6	0.8	0.5	0.65
Post tax cost of equity	4.6%	8.0%	5.2%	6.7%
Gearing	15.0%	50.0%	8.0%	8.0%
Debt premium	0.5%	0.5%	0.3%	0.7%
Post-tax cost of debt	2.5%	3.0%	3.8%	4.5%
Real Post Tax WACC	4.3%	7.3%	5.1%	6.5%
Real Pre Tax WACC	5.2%	8.8%	6.1%	7.8%

Notes:
OFTEL estimates of the range for the post-tax and pre-tax WACC cannot be derived directly from the high and low values of the components due to different tax and gearing adjustments.
The MMC range for the cost of debt does not distinguish post-tax from pre-tax rates.
OFTEL range of pre-tax WACC estimates depends upon the simplifying assumptions in the text and does not incorporate the full range of gearing shown in the table.

E.51 A breakdown of the components of the range of cost of capital estimates for BT is compared with those used by the MMC for Scottish Hydro-Electric's distribution business in Table E.5. It is important to note that the two businesses would not be expected to have the same cost of capital since they have different risk characteristics and gearing ratios. OFTEL's wider range also reflects uncertainty at this stage over the size ofthe equity risk premium, the level of desirable gearing, and the size of the tax adjustment necessary to derive a pre-tax WACC. OFTEL hopes to receive submissions on the indicative range for the pre-tax WACC and its components as a result of this consultation exercise.

III APPROPRIATE MEASURES OF RATE OF RETURN

E.52 There are two main options as to the measure of the rate of return to be used in the financial modelling process: economic or accounting rates of return.

Economic rates of return

E.53 Rates of return on an investment project are typically calculated as the internal rate of return (IRR). This is the discount rate which equates the revenue streams of a project with the costs of the project. This measure requires an initial and terminal economic value of the asset base (at the start and end of the period) as well as the free cash flows in each year of the period. Rates of return calculated on this basis are directly comparable with the returns required by investors and lenders in order to induce them to supply the necessary funds. Economic rates of return therefore benefit from being directly comparable with BT's cost of capital, as calculated by any of the methods discussed in the previous section.

E.54 Measuring economic rates of return would, however, raise a number of practical difficulties.

Firstly, economic rates of return can be very sensitive to the profiles of cash flows, such as the timing of capital expenditure, which it is difficult to forecast with any accuracy. Secondly, the estimate of the terminal value of the asset base in the IRR calculation is fraught with difficulties and is highly subjective. Finally, and perhaps most importantly, price controls should be based upon measures of financial performance which are transparent and understood by BT, its competitors and the wider community. There could be significant potential for confusion if OFTEL were to set a price control based upon one measure of profitability (economic rates of return) when BT reports to its shareholders on the basis of another measure (historic cost accounting rates of return on capital employed).

E.55 The alternative to an economic rate of return, measuring profitability as an accounting rate of return, would not however be free from difficulties. Although OFTEL would use a definition of the accounting rate of return which would better reflect the economic rate of return than would rates of return on an HCA basis (for reasons discussed below), any differences would in principle require an adjustment to the cost of capital to ensure comparability. But, in making the adjustments to the cost of capital, difficulties would arise, which are similar to those set out above for measuring economic rates of return. OFTEL will continue to explore this issue during the price control review.

Accounting rates of return

E.56 Accounting rates of return express the ratio of accounting profit to the contemporaneous value of capital. Both numerator and denominator vary between firms depending on the accounting conventions adopted, including the choice of Current Cost Accounting (CCA) or Historic Cost Accounting (HCA). The main differences relate to the treatment of fixed assets in the balance sheet and the depreciation charge to the profit and loss account. There are three main forms of bias which can prevent an accounting rate of return from being directly comparable to the cost of capital discussed in the section above. These occur when assets are not valued in Modern Equivalent Asset (MEA) terms, when profits are not measured as a 'clean surplus', and when depreciation policies and asset lives used in the balance sheet do not reflect underlying economic values.

Accounting valuations of assets

E.57 BT uses the conventional HCA basis of accounting, where fixed assets are valued at original purchase cost net of cumulative depreciation. This has the merit that most of its competitors use the same method of asset valuation. However, HCA rates of return are not directly comparable with estimates of BT's cost of capital. The explanation for this is that the net book value of fixed assets in historic cost terms will not in general be equal to the economic value of capital employed. HCA net book values take no account of general price inflation or changes in the relative price of specific assets over the period since they were purchased, and so do not properly measure the cost of the resources employed.

E.58 CCA asset valuations attempt to correct for this effect by valuing fixed assets at the net replacement cost of a Modern Equivalent Asset of the same service capability, allowing for the remaining useful asset life. Since this valuation uses current fixed asset prices, it takes into account general inflation and specific asset price changes that have taken place since the asset was purchased. The CCA rate of return would therefore provide a better approximation to the economic rate of return than would the HCA rate of return.

E.59 When changing the basis of the measurement of rate of return from HCA to CCA, it will be necessary to ensure that the revaluation of assets does not result in windfall gains or losses accruing to the shareholders of BT. For a discussion of this issue in the context of the network charge cap, see Chapter 5. The avoidance of windfall gains or losses would require that profit were measured as a 'clean surplus', ie the revaluation surplus (or deficit) should be reflected in the profit and loss account. The concept of 'clean surplus' is discussed further below.

Depreciation policies in the balance sheet

E.60 In a company balance sheet, depreciation charges represent the charge to profits necessary to recover the loss of asset value which arises as the asset is consumed over its life. For practical reasons, this will typically be on a straight-line depreciation basis, where an equal proportion of the gross book value of the asset is written down in each year of the asset's life.

E.61 However, when using net book values as the denominator in a rate of return calculation, there would be a closer reflection of economic rates of return if the asset lives and depreciation profiles were chosen so as to correspond to the true economic lives and the rate at which the asset is used up over its life. In other words, CCA accounting rates of return would better approximate to economic rates of return if accounting depreciation were more closely aligned to economic depreciation. Since there could be practical difficulties in implementing this adjustment, it is an issue that will be explored further during the price control review.

Accounting measures of profit

E.62 Another possible source of bias may be introduced by the accounting measure of profit used in the accounting rate of return calculation and, in particular, the depreciation charge to the profit and loss account. Under CCA procedures, there are two main alternative principles which may be followed: these are operating capability maintenance (OCM) and financial capital maintenance (FCM).

E.63 Under OCM, the HCA depreciation charge is adjusted to take into account changes in the MEA valuation of the asset since the start of the accounting period. Barring unexpected events, this will enable sufficient funds to be put aside before the distribution of profit in each year for the asset to be replaced at the end of its life. In a world where asset prices are rising, an OCM depreciation charge to the profit and loss account will be higher than the corresponding HCA depreciation charge.

E.64 Whilst an OCM approach to depreciation will, as its name suggests, enable a firm to maintain its operating capability, it will not in general give a measure of profit and hence rate of return that is comparable to the firm's cost of capital, even when assets are valued in CCA terms. This is because it neglects the fact that a change in the MEA value of the firm's assets from one year to the next represents a change in the wealth of its shareholders.

E.65 An FCM depreciation charge to the profit and loss account therefore includes an additional holding gain or loss equal to the change in the MEA value of the firm's assets between periods. The resulting profit is sometimes described as a 'clean surplus'. This represents the amount that can be distributed after maintaining the nominal value of the firm's financial capital. Provided the depreciation policy used in the balance sheet is economically justified, and subject to certain other restrictive assumptions, CCA rates of return calculated on this basis can be comparable with the firm's nominal cost of capital.

E.66 A further adjustment is possible to put the calculation into real terms. In order to maintain the real value of shareholders' funds, profits must additionally be reduced by a further 'shareholder adjustment' equal to the rate of inflation over the period multiplied by the value of shareholders' funds at the start of the period. No adjustment is necessary to maintain the real value of debt, since lenders receive a nominal interest rate which already reflects their expectations of inflation.

Conclusion

E.67 In theory, it would be desirable to use economic rates of return in the financial modelling, since these are directly comparable to the cost of capital that was discussed in the previous section of this Annex. However, there are merits in a modelling approach based upon accounting rates of return. If an accounting rate of return were used, it should be measured using CCA conventions (on an FCM basis) rather than HCA, in order to reflect

more closely the nature of forward-looking costs. OFTEL will need to ensure that the implications of its chosen approach for the HCA rates of return reported in BT's accounts are fully explained, since these are the only measures of BT's financial performance available to and understood by a wider audience.

IV STRUCTURE OF FINANCIAL MODEL

E.68 The expected future financial performance of BT will be assessed using a financial model. The model will be used to project forward BT's costs, revenues and capital employed for the services within each tariff basket. In general, the more disaggregated a model, the more realistic it is. For this review, where it is proposed that a network price cap will exist side by side with a retail price cap, it is particularly important to model BT's financial performance at the network and retail level.

E.69 Because a large proportion of BT's costs and fixed assets are shared between activities inside and outside the proposed price control baskets, it is essential to expand the coverage of the model to include all those activities where there is the potential for costs or assets to be shared. This might include BT's non-regulated activities as well as non-price-controlled services.

E.70 Based upon the forecasts derived from the model, a range of values of X will be chosen for each price control so as to allow BT to earn an expected rate of return which OFTEL regards as acceptable by the end of the control period (subject to the caveat in the introduction to this Annex). This in turn depends upon the view that OFTEL takes upon BT's cost of capital for those services and upon the calculation of the rate of return earned on them, as discussed in the previous sections.

E.71 In the March consultative document, OFTEL intends to publish the details of the range of X for each tariff basket and sub-cap that it proposes as a result of its financial modelling. At the same time, it will explain the assumptions and parameters underlying the range of price controls, as well as the forecasts of the financial performance that BT is expected to achieve in the activities within each price cap or sub-cap.

V ASSUMPTIONS UNDERLYING FINANCIAL FORECAST

E.72 In order to model BT's financial performance, it is necessary to take a view on a number of different variables and parameters. The most important of these are the following:

- the potential growth in demand for each service offered by BT (including non-regulated services) - this can be broken down further into the growth in the total market for each service (supplied by whichever company) and BT's share of each service market
- the relationship between BT's costs and the volumes of outputs produced
- the scope for improvements in BT's productivity (ie the volume of output which BT produces per unit of capital, labour and other inputs)
- the future movements in BT's input prices (eg wages, capital equipment)
- the allocation of overheads and fixed assets (including new capital expenditure) to the price-controlled business, after taking into account expansion of BT's non-price-controlled activities.

E.73 Each of the main model input assumptions is discussed in more detail below.

Market growth

E.74 Market growth is one of the most important determinants of BT's financial performance over the next control period. A given change in the volume of output of a particular service can have a significant effect on profitability if economies of scale are important (see discussion in para. 4.21 of Chapter 4). This is likely to be the case for many of the services supplied over BT's network since, in the short run, the marginal cost of supplying an additional telephone call is negligible. This means that an increase in call revenues may lead to an almost one to one increase in measured profits.

E.75 This makes it crucially important that volume growth assumptions for each service market incorporate the full range of possible outcomes. Preferably, demand growth forecasts should be related in an objective way to the underlying determinants of demand for each product (eg by applying statistical techniques to historical data). These would typically include the market price, the price of substitute and complementary products, an income variable (eg GDP) and any others (which might be captured by a time trend). Depending on the market in question, the market price, which in the past has effectively been that set by BT subject to the constraint imposed by its price cap, will increasingly be determined by the extent of actual or potential competition in the market (see the discussion of Effective Competition in Chapter 3).

E.76 In practice, the main determinants of the strong growth in demand for basic telephony since privatisation (as displayed in Tables 7.4 and 7.5 of Chapter 7) have been, in rough order of importance, rising real incomes, technological innovation (eg the falling price of fax machines) and falling real call prices (as a result of price cap regulation and increasing competition). The assumptions made about these influences will have the biggest impact on forecasts of demand over the next forecast period.

Market shares

E.77 Alongside a forecast of the total market demand for a given product, a view needs to be taken on what share of that demand will be supplied by BT's network or retail operations. In general, this requires assumptions on the price BT will charge for each product over the price control period (within the constraint imposed by any basket price cap or sub-cap), the prices its competitors charge, and the propensity for consumers to switch supplier for a given price differential.

E.78 Table 7.6 in Chapter 7 shows how BT's market shares in the supply of exchange line connections, inland and international calls have fallen since 1991/92. When considering the factors that have contributed to the loss of market share by BT recorded so far, and projecting this forward into the next price control period, it is useful to draw a distinction between direct and indirect market share loss by BT.

E.79 BT's directly-connected customers will, by definition, obtain their exchange line connection from BT's retail operations. In the absence of additional benefits from cable TV connection or access to broadband services, they will only tend to switch to a different access supplier if they expect their total bill (access and call charges) to fall, given their pattern of calls. Hence, market share loss forecasts for directly connected customers will depend mainly upon the relative price of an average basket of services for customers with different demand profiles purchased from BT Retail, compared to an equivalent basket bought directly from an alternative access supplier.

E.80 This requires a view to be taken on BT's and competitors' pricing strategies and on how quickly different groups of consumers (eg residential and business customers with different demand profiles) will switch access supplier in response to a given expected saving on their average bill. This will change with the advent of number portability.

E.81 In addition to direct market share loss as an access provider and supplier of retail telephony, BT Retail is vulnerable to indirect market share loss in inland and international calls to competing trunk operators (eg Mercury, Energis, ISR operators) which interconnect with BT Network. It would be expected that the loss of market share by BT Retail

to indirect competitors would be more closely related to the relative price of BT Retail for the service in question. Assumptions regarding indirect market share loss will therefore depend upon, assumptions about BT Retail prices for individual services (subject to the level of the retail price cap), as well as competitors' prices and the propensity to switch for a given price differential. It might be expected that a given price differential would induce higher indirect than direct market share loss, because of customer inertia and the risk involved in switching access providers.

E.82 Once a customer has switched access supplier to another licensed operator (eg a cable company, Mercury), their custom will be lost to BT's retail operations. However the access supplier will still need to purchase access to BT's network for the majority of calls, either through an existing interconnect agreement with BT, by purchasing interconnect components at BT's network component tariff, or by purchasing long-distance conveyance from another operator who in turn pays BT for interconnect at the terminating end.

E.83 Demand for BT Network's interconnect services will then depend on:

(a) BT's share of directly-connected customers; and

(b) BT's market share in the supply of different network components.

The latter will in turn depend upon the tightness of the network price cap and sub-cap on call terminations, the network tariff structure that BT adopts given that constraint and the pricing strategies of competing suppliers of trunk conveyance, amongst other things.

Costs and efficiency

E.84 As well as revenues derived from the demand model discussed above, the financial model needs to be able to forecast in some detail the costs incurred by BT. These will be driven by three main factors. Firstly, higher demand for one or more of BT's services will, in the absence of offsetting efficiency gains, lead to higher derived demand for one or more factor inputs (eg labour, capital). Secondly, the volumes of output produced per unit of input may increase as BT becomes more efficient due to the incentives given by price cap regulation and emerging competition, or because of general industry developments. Thirdly, the prices of factor inputs may change, either due to downward pressure being placed on suppliers' prices by BT or because of technical change or other factors out of BT's control.

E.85 The first of these determinants of costs requires estimates of the relationship between different components of BT's costs and the volumes of different services supplied. These should preferably be broken down by factor inputs, eg switching capacity, numbers of person-hours.

E.86 BT's efficiency has already been discussed in relation to the assessment of BT's relative efficiency at the start of the next control period. What is required is an estimate of how BT's productivity is likely to improve over the next control period in the key service areas in which it operates. The standard measure of efficiency that has been calculated for BT by OFTEL in the past is an index of real unit costs, which measures the total cost incurred by BT per unit of output.

E.87 This measure of efficiency has the property that it combines factor price changes with reductions in the volumes of factor inputs consumed. Hence, a tight price control based upon expected real unit cost reductions could be met either by increasing the amount of output produced per unit of factor input, or by exerting downward pressure on the prices paid for inputs to the extent that these are not already sourced from the cheapest suppliers.

E.88 Since privatisation, BT's real unit costs have fallen by around 3.5% per annum on average for a set of services which broadly corresponds to those currently in the PSTN tariff basket. One problem with basing assumptions about productivity gains for the next control period on those achieved historically is that the past may not be a good guide to the future. The potential for further efficiency gains may be less than before if the firm has already implemented 'best practice'. Alternatively, future technological developments may make possible far greater efficiency gains than could have been achieved in the past.

E.89 Comparisons of BT's efficiency with key domestic competitors or comparable overseas operators can help address the first of these problems, by showing the extent that BT still lags behind. As discussed in Chapters 5 and 7, preliminary results from benchmarking studies suggest that BT's efficiency across its combined Access, Network and Retail Systems businesses may be up to 10% worse than that of the best-performing comparable competitors.

Overheads, fixed assets and capital expenditure

E.90 As referred to above, a large proportion of BT's costs and fixed assets are shared between regulated and non-regulated activities. At a review, there is an incentive on BT to understate its true profitability by allocating an excessive proportion of fixed costs and assets to those activities which are price-controlled.

E.91 To some extent this problem has been alleviated by the implementation of Accounting Separation, which has set out a clear basis upon which joint and common costs should be allocated to Access, Network and Retail businesses. However, in modelling BT's financial performance one important area of concern is in ensuring that new capital expenditure proposed by BT for its price-controlled business over the next control period is, firstly, efficiently incurred and, secondly, is allocated appropriately to BT's price-controlled activities.

E.92 One way of checking that BT's investment proposals incorporate an appropriate allocation across services is to project forward capital expenditure for those activities within a price control basket on a CCA basis. After taking into account the effect of volume growth on demand for new fixed assets (using the cost/ volume relationships discussed above), gross capital expenditure should be equal to depreciation, when this is measured on a CCA basis. This is an additional benefit of forecasting on a CCA basis.

E.93 OFTEL intends to explain its proposed treatment of BT's capital expenditure programme over the next control period, as well as other aspects of overhead and fixed asset allocation, in the March consultative document.

ANNEX F

Glossary of Terms

Accounting Rate of Return (ARR)

The ratio of accounting profit to capital employed, also referred to as Return on Capital Employed (ROCE). The measure of capital employed can be either HCA or CCA.

Allocative Efficiency

The extent to which the economy's finite resources are deployed in a fashion so as to derive maximum benefit. An important condition is that prices reflect underlying costs.

Broadband Switched Mass Market Services

Services aimed at a mass market delivered over broadband switched telecoms networks.

Common Costs

Costs that are incurred in the supply of all or a group of services provided by the firm and cannot be directly attributed to any one service. Common costs arise from the existence of *economies of scope*.

Current Cost Accounting (CCA)

An accounting methodology, where assets are valued and depreciated according to their current replacement cost. Typically this will be the cost of a Modern Equivalent Asset (MEA).

Discount Yield

The value of discounts from the standard tariff BT was offering at 31 July 1993, which BT must maintain in accordance with Condition 24C of its licence, or offer equivalent reductions in standard prices.

Economic Rate of Return

See Internal Rate of Return.

Economies of Scale

These are present where the unit cost falls as the level of output rises.

Economies of Scope

These are present where the unit cost of a service is lower because the firm also provides other services, ie the provision of service B reduces the unit cost of supplying service A.

Efficient Component Pricing Rule (ECPR)

A rule for determining interconnection prices, under which the price is composed of the incremental cost of providing the interconnection service plus the profit (including contribution to common costs) that the network operator foregoes by selling interconnection rather than the final service for which interconnection is used.

Equal Proportionate Mark-ups

A method of recovering the common costs of the network, where the proportional mark-up on the incremental cost of conveyance and access is equal.

Financial Capital Maintenance (FCM)

A CCA accounting convention, where the depreciation charge to the profit and loss account includes holding gains or losses due to changes in asset prices, in addition to the OCM depreciation charge.

Financial Results By Service (FRBS)

The FRBS is a set of financial statements drawn up by BT on an annual basis and provided to OFTEL for regulatory purposes until financial year 1993/94. They provide accounts information at the service level (eg local calls, national calls, access lines).

Financial Statements For the Businesses and Activities

The regulatory accounts that BT is required to publish under Accounting Separation, which give information down to the level of business (Access, Network and Retail) and disaggregated retail activity (eg local calls, national calls, access lines).

Forward-looking Costs

An assessment of costs on the basis that any costs which arise from past decisions should be ignored when calculating the profitability of current and future decisions. As well as future operational costs, the costs of maintaining and replacing assets are included.

Fully Allocated Costs

An accounting approach under which all the costs of the firm are distributed between its various services. The fully allocated costs of a service may therefore include some *common costs* that are not directly attributable to the service.

Geographic Averaging

The principle under which BT charges customers the same price for a given service wherever they are in the country, subject to its published tariff.

Historic Cost Accounting (HCA)

The conventional accounting methodology, where assets are valued and depreciated according to their cost at the time of purchase.

Incremental Costs

The costs that arise as a result of the provision of the "increment". In this document, the increment refers to a service. In contrast to *fully allocated costs*, the incremental costs of a service include only those costs that are directly caused by the provision of the service. So long as service revenue exceeds incremental costs, the firm improves its profitability by providing the service.

Internal Rate of Return (IRR)

The discount rate which equates the revenue streams of a project with the costs of the project, also known as Economic Rate of Return.

International Simple Resale (ISR)

Collecting traffic from the PSTN in the UK, switching it onto a leased line to another country across the international gateway which is operated by BT or Mercury, and then breaking back out onto the public network in the other country.

ISDN

Integrated Services Digital Network - a network providing end-to-end digital connectivity, supporting a wider range of narrowband services than available across the PSTN.

The Light User Scheme (LUS)

The present Scheme fulfils a licence condition requiring BT to offer a lower tariff to customers making few telephone calls. Under current Guidelines, customers whose call charges place them in the lowest 20% by usage (£10.80 per quarter at present) can claim a tapered discount on line rental charges, up to a maximum rebate of 60% if no outgoing calls are made.

Local Delivery Operator (LDO)

The new generation of broadband cable franchisees, ie those awarded franchises under the 1990 Broadcasting Act rather than the 1984 Cable and Broadcasting Act. The major difference between the two is that LDOs are specifically allowed to use radio to deliver entertainment services to the end user.

Marginal Cost

The cost of supplying an extra unit of output.

Mean Capital Employed

BT's definition of Mean Capital Employed is total assets less current liabilities, excluding corporate taxes and dividends payable, and provisions other than those for deferred taxation. The mean is computed from the start and end values for the period, except in the case of short-term investments and borrowings, where daily averages are used in their place. OFTEL's adjustments (as in the Financial Statements) involve the inclusion of corporate taxes in current liabilities and the use of period start and end values for short-term

investments and borrowings rather than daily averages.

Modern Equivalent Assets (MEA)

The valuation of the firms' existing assets at the cost of replacing them with assets which serve the same function and which a new entrant might be expected to employ. Such assets are likely to incorporate the latest available (proven) technology.

Operating Capability Maintenance (OCM)

A CCA accounting convention, where the depreciation charge to the profit and loss account relates to the current replacement cost of the firm's assets, taking account of specific and general price inflation.

Productive Efficiency

Productive efficiency is maximised when each firm in the industry carries out its activities at minimum cost and when activities aredistributed between firms such that industry-wide costs are minimised.

PSTN

Public Switched Telephone Network. The telecommunications networks of the major operators, on which calls can be made to all customers of all PSTNs.

Return on Capital Employed (ROCE)

See Accounting Rate of Return.

Stand-alone Costs

The costs to a single-product firm of providing a service. The stand-alone costs of a service exceed the *incremental costs* to a multi-product firm if there are *economies of scope*.

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PRICING OF TELECOMMUNICATIONS SERVICES FROM 1997

Annexes to the Consultative Document

This is the second part of the Consultative Document on BT price controls and interconnection charging. It contains the six annexes (Annexes A-F) referred to in the main document.

CONTENTS